

Inventory of *Doing What Works* (dww.ed.gov) Professional Development Materials

Topic: *National Math Panel: Major Topics of School Algebra (MP2)*

TOPIC SUMMARY		
Title/Media Type	Who	Description
<i>National Mathematics Advisory Panel</i> Multimedia Overview 3:25 min		This overview explains the purpose and findings of the National Mathematics Advisory Panel and research-based recommendations for improving mathematics instruction. An explanation is provided on how teaching critical mathematics skills can better prepare students for entry into algebra.
<i>National Math Panel: Major Topics of School Algebra</i> Multimedia Overview 4:25 min		This overview explains the major topics of school algebra recommended by the National Mathematics Advisory Panel and two identified practices to support authentic algebra instruction for all students.
<i>The Major Topics of School Algebra</i> Visual Diagram		This diagram illustrates 2 practices based on the recommendations in the National Mathematics Advisory Panel report. It can be used to engage teachers in discussion helping students learn school algebra and providing multiple paths to ensure that all students succeed.
<i>Key Messages of the Panel Report</i> Expert Interview 6:03 min	Larry R. Faulkner, Ph.D. Houston Endowment Chair	<ul style="list-style-type: none"> • Dr. Faulkner discusses the Panel's key recommendations and how the research findings relate to educators & can inform their instructional practice. • It is important for teachers to teach fewer topics focused on the critical foundations for students to succeed in algebra. • There is a need for simultaneously teaching conceptual understanding, computational fluency, and problem-solving skills.

TOPIC SUMMARY		
Title/Media Type	Who	Description
<i>Understanding the Major Topics of School Algebra</i> Expert Interview 7:11 min	Wilfried Schmid, Ph.D. Harvard University	<ul style="list-style-type: none">• Dr. Schmid provides an overview of the Panel’s recommended major topics of algebra and the implications for algebra instruction.• He provides an example of why the topic of functions is important and explains whether a specific order of algebra topics should be followed.

Topic: *National Math Panel: Major Topics of School Algebra (MP2)*

Practice: *Teach the comprehensive set of major topics in algebra recommended by the National Mathematics Advisory Panel. (Topics of Algebra)*

PRACTICE SUMMARY

Title/Media Type	Description
<i>School Algebra Topics</i> Multimedia Overview 7:08 min	<ul style="list-style-type: none"> An overview of the recommended algebra topics and the importance of making connections across topics. Research is identified about types of practice for learning algebra, including value of worked out examples and practice with translating problem statements.

LEARN WHAT WORKS

Title/Media Type	Who	Description
<i>A Coherent Algebra Framework</i> Expert Interview 9:54 min	Hung-Hsi Wu, Ph.D. University of California at Berkeley	<ul style="list-style-type: none"> Dr. Wu discusses the topics of school algebra and their importance for student learning. He explains and provides examples of each foundational topic, describes the connections across topics, and talks about some common difficulties that teachers have in learning and teaching algebra. Algebra should not be taught as a sequence of disjointed, isolated topics.
<i>What Algebra Teachers Need to Know</i> Expert Interview 5:46 min	Hung-Hsi Wu, Ph.D. University of California at Berkeley	<ul style="list-style-type: none"> Dr. Wu explains the importance in helping teachers develop a deep understanding of the math content. Instruction should be focused on the most critical aspects of algebra. Learning the connections among topics helps students integrate previous knowledge with current learning.

SEE HOW IT WORKS			
Title/Media Type	Who	Description	Sample Material
<i>Teaching Symbols and Expressions</i> Presentation 6:41 min	Terri Porto Twin Groves Middle School Buffalo Groves, IL	<ul style="list-style-type: none"> An algebra teacher teaches how to simplify expressions and solve equations. Students complete practice problems during and after the lesson. It is important for students to have prerequisite skills and understand terminology. 	<i>Assignment: Simplifying Expressions</i> —A lesson plan, problem worksheet, and homework practice problems on simplifying expressions. Included are strategies for struggling students.
<i>Application of Linear Equations</i> Slideshow w/ audio (11 slides)	Roger Miller Chris Zimmerman Legend High School Douglas County, CO	<ul style="list-style-type: none"> Two algebra teachers introduce linear equations using scatterplots and trend lines. Students are asked to determine relationships between two variables using scatterplots. As a class, students collect and examine data. Students make posters from two-variable data. 	<i>Algebra I Initial Units</i> —Units used to initiate students into algebra content. The first unit transitions students from arithmetic to algebra; the second unit introduces equations and expressions; the third unit begins students on graphing. Each unit specifies standards, essential questions, assignments and assessments, and vocabulary to be mastered.
<i>Problem Solving in Algebra</i> Presentation 7:21 min	John Lawless Castle View High School Castle Rock, CO	<ul style="list-style-type: none"> A math content lead demonstrates a lesson on solving visual problems using polynomial expressions. He models problem-solving steps and writing about problem solving. 	<i>Assignment: Problem Solving</i> —A student practice assignment using polynomials to create graphic designs. Students must find equations that will put pictures and letters on the screen of a graphing calculator.
<i>Teaching Quadratic Functions</i> Presentation 7:31 min	Wendy Loeb Twin Groves Middle School Buffalo Groves, IL	<ul style="list-style-type: none"> An algebra teacher demonstrates a lesson about graphing quadratic equations by hand and with a graphing calculator. Students learn to find the vertex, identify characteristics of a parabola, and to apply quadratic functions to real-world problems. 	<i>Properties of Parabolas</i> —A lesson plan for 8th-grade students on graphing quadratic equations in standard form and finding minimum and maximum values by hand and using a graphing calculator.

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Title/Media Type	Who	Description	Sample Material
<i>Introducing Students to Logarithms</i> Presentation 7:08 min	Raegen T. Miller Education Policy Analyst	<ul style="list-style-type: none"> An experienced teacher describes common pitfalls when introducing logarithms. Leverage students' prior knowledge of algebra to increase their comfort with new topics. 	No Sample Material
<i>Finding Patterns Within Functions</i> Presentation 5:11 min	Julie Shively U.S. Department of Education Teaching Fellow	<ul style="list-style-type: none"> A 4th- and 5th-grade teacher discusses providing students practice with basic functions. Students have difficulty understanding what causes graphs to change form. Students start practicing with different basic functions and then with variations. 	<i>Lesson Objectives and Handouts: Finding Patterns Within Functions</i> —Lesson objectives and student handouts for lessons on: Absolute Value Function Exploration, Exponent Function Exploration Squares, Rational Function Exploration, and Comparing Functions.
<i>District Perspective on Algebra</i> Audio Interview 5:47 min	Larry Linnen, Ph.D. Castle View High School Legend High School Douglas County, CO	<ul style="list-style-type: none"> A district math coordinator describes how teachers work together to establish essential algebra learnings. Model algebraic concepts to connect manipulatives to symbolic representation. Interim assessments implement an awareness and expectation for algebra competency. 	<i>Mathematics Essential Learnings</i> —A district-developed essential learnings for secondary math courses, including algebra. It identifies the most important topics and skills for each math course.

DO WHAT WORKS	
Tool	Description
<i>Learning Together About the Topics of Algebra</i>	A workshop that can be used to guide mathematics teachers and leaders about the recommendations of the National Mathematics Advisory Panel for school algebra.
<i>Topics of Algebra Review</i>	A tool to assess the degree of congruence between the suggested topics of school algebra recommended by the National Mathematics Advisory Panel and the standards, curriculum, and assessments currently in use in the district.
<i>Learning From Algebra Teaching Peers</i>	An observation tool for teachers to use to learn from other teachers and determine which practices might be adaptable to their own teaching.
Planning Templates	Comprehensive planning templates for working with districts and schools on improving the sequence of algebra courses.

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Practice: Expect that all students will learn school algebra through a coherent progression of topics. (*Multiple Paths*)

PRACTICE SUMMARY

Title/Media Type	Description
<i>Multiple Pathways to School Algebra</i> Multimedia Overview 7:17 min	<ul style="list-style-type: none"> This overview describes various curricular approaches that enable teachers to respond flexibly to a range of student levels. Have the expectation that all students can be successful in learning algebra. Different configurations of math courses can be effective as long as all major math topics of algebra are covered.

LEARN WHAT WORKS

Title/Media Type	Who	Description
<i>Helping Students Who Aren't Ready for Algebra</i> Expert Interview 4:14 min	Bonnie Grossen, Ph.D. Center for Applied Research in Education	<ul style="list-style-type: none"> Dr. Grossen describes the collision between algebra requirements and student preparation. She describes the challenges for algebra teachers in working with unprepared students and problems students have with fractions, decimals, percents. Programs are needed to support students who have not mastered fundamentals. Teachers need more time and efficient, organized curriculum to catch students up.
<i>Instructional Strategies for Struggling Algebra Students</i> Expert Interview 6:41 min	Bonnie Grossen, Ph.D. Center for Applied Research in Education	<ul style="list-style-type: none"> Dr. Grossen suggests ideas for working with students who are struggling with algebra. Implement small segments within a lesson: review of facts, development of algebra concepts, practice. Explicit, teacher-centered instruction is more democratic than small group/student-centered discovery. Provide table lookups for students who are weak with multiplication facts.

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Title/Media Type	Who	Description	Sample Material
<i>Helping Struggling Learners in Algebra</i> Presentation 6:19 min	Sally Collins Castle View High School Castle Rock, CO	<ul style="list-style-type: none"> An algebra teacher shares ideas for overcoming students' lack of preparation for algebra. Use questioning and discussions to increase students' understanding of concepts. Use group work to focus students' learning. 	No Sample Material
<i>Helping All Students Learn Algebra</i> Presentation 6:16 min	Paul Jorgens Terman Middle School Palo Alto, CA	<ul style="list-style-type: none"> A math teacher explains how to develop the arithmetic skills students need for algebra. He describes activities about graphs, tables, equations, and learning terminology. Teach concepts in stages, beginning with whole numbers, then negative numbers and fractions. Build opportunities for students who are accelerating by differentiating instruction. 	<i>Linear Mingle</i> —A flashcard matching activity to help students build fluency with algebraic vocabulary, concepts, and symbols. <i>Linear Graph Back to Back</i> —An activity to help students develop their communication skills with algebra vocabulary. In pairs, students take turns orally describing a graph while the other draws the graph.
<i>Algebra Boot Camp</i> Audio Interview 4:47 min	Marie Pelosi Longfellow Middle School Falls Church, VA	<ul style="list-style-type: none"> A math department chair describes essential math concepts taught in a summer algebra boot camp. She explains the rationale for implementing the boot camp and student attainment goals. Students complete grade-free assessments to ensure learning of concepts. 	No Sample Material
<i>Accelerated Algebra</i> Audio Interview 4:22 min	Barbara Burnett Longfellow Middle School Falls Church, VA	<ul style="list-style-type: none"> An Honor's algebra teacher describes ways to challenge accelerated students. The Honor's algebra course extends the core algebra curriculum with advanced work with equations and word problems. 	No Sample Material

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Title/Media Type	Who	Description	Sample Material
<i>Professional Development in Secondary Mathematics</i> Audio Interview 6:06 min	Lisle Gates Castle View High School Castle Rock, CO Corey Wise Legend High School Parker, CO	<ul style="list-style-type: none"> 2 high school principals discuss professional development opportunities for math teachers. Use professional learning communities to focus on instructional issues. Develop individualized performance plans for teachers. Learn from teachers outside the subject and level, and through peer observation. 	No Sample Material
<i>State Perspective on Algebra</i> Audio Interview 5:42 min	Marlene Lovanio Connecticut State Department of Education	<ul style="list-style-type: none"> A state leader describes how the Panel's report sparked change in Connecticut. Devise a new model curriculum in Algebra I and proposed statewide assessment. Professional development for teaching challenging concepts for long-lasting understanding. 	No Sample Material

DO WHAT WORKS	
Tool	Description
<i>Learning Together About Multiple Paths</i>	An activity to engage math teachers and leaders in a discussion about current student success rates in algebra and what options might be needed to help more students become successful in learning algebra.
<i>Systematic Analysis of Student Errors</i>	An assessment tool to help teachers review the work of students who are struggling in algebra and identify the types of errors students consistently make when solving algebra problems.
<i>Algebra Pathways Inventory: Working With Struggling Algebra Students</i>	A self-assessment tool for teachers to consider whether or not they are implementing practices that might help students who are struggling in algebra.
Planning Templates	Comprehensive planning templates for working with districts and schools on improving the sequence of courses and adding supports needed to help all students be successful in algebra.